

THE HALIFAX FIELD NATURALIST



No. 182
March to May, 2021

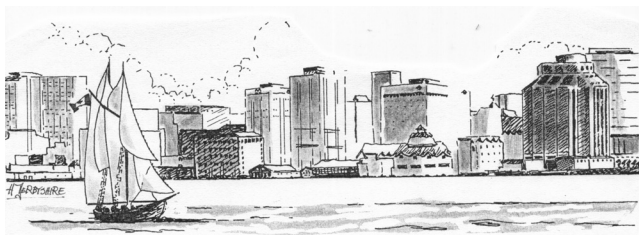


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Return address: HFN, c/o NS Museum of Natural History, 1747 Summer Street, Halifax, N.S., B3H 3A6

HFN is incorporated under the Nova Scotia Societies Act and holds Registered Charity status with the Canada Revenue Agency. Tax-creditable receipts will be issued for individual and corporate gifts. **HFN** is an affiliate of Nature Canada and an organisational member of Nature Nova Scotia, the provincial umbrella association for naturalist groups. **Objectives** are to encourage a greater appreciation and understanding of Nova Scotia's natural history, both within the membership of HFN and in the public at large, and to represent the interests of naturalists by encouraging the conservation of Nova Scotia's natural resources. **HFN Talks** during COVID-19 restrictions are for members only, via Zoom, on the first Thursday of every month at 7:30 p.m (except for July and August). **HFN Field Trips** are held at least once a month; during COVID-19 restrictions they are for members only. **Participants** in HFN activities are responsible for their own safety. Everyone, member or not, is welcome to take part in most field trips. **Memberships** are open to anyone interested in the natural history of Nova Scotia. Forms are available at any meeting of the society, or by writing to: Membership Secretary, Halifax Field Naturalists, c/o N.S. Museum of Natural History. Members receive **The Halifax Field Naturalist**, along with its included **Programme**, quarterly. Our membership year is from January 1st to December 31st, and new memberships received from September 1st to December 31st of any year are valid until the end of the following membership year.



Halifax Field Naturalists, c/o N.S. Museum of Natural History, 1747 Summer St., Hfx, N.S., B3H 3A6 **Email:** hfninfo@yahoo.ca
Website: halifaxfieldnaturalists.ca **Facebook** – enter **Halifax Field Naturalists** or **HFN**.

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|-----------------------|--|
| EXECUTIVE | |
| President | Burkhard Plache..... 475-1129 |
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| Secretary | Peter Webster..... 453-9244 |
| Past President | Janet Dalton..... 443-7617 |
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| | |
|---------------------|--------------------------------------|
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| Membership | Ron Arsenault..... 410-6868 |
| Programme | |
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| Talks/Trips | Chair Clarence Stevens..... 864-0802 |
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| Conservation | Heather Leslie..... |
| | David Patriquin..... 423-5716 |
| | Clare Robinson..... 446-6603 |
| NNS Rep. | Ron Arsenault..... 410-6868 |
| YNC Rep. | Brian Bartlett..... 420-0315 |
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| CSC Award | Elliott Hayes..... 835-9819 |
| | Doug Linzey..... 1-902-582-7176 |
| | David Patriquin..... 423-5716 |
| | Allan Robertson..... 422-6326 |

| | |
|-------------------------|------------------|
| FEES | |
| Student | \$15.00 per year |
| Individual | \$20.00 per year |
| Family | \$25.00 per year |
| Supporting | \$30.00 per year |
| NNS (opt.) | \$5.00 per year |

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GRAPHICS All uncredited illustrations by H. Derbyshire or from copyright-free sources. **Front Cover** - Robin nestlings, Lesley Jane Butters; p.11 - cartoon, Russ Brown; p 14 -frogs, Rebecca Betts; **Back Cover** - those Robins' eggs, Lesley Jane Butters; **Winter 2020 Tide Table** - Canadian Hydrographic Service, Fisheries & Oceans Canada.

HFN REVIEWS AND TIDBITS

FROM THE EDITOR

Appropriately, in a climate of global warming, animal-spread diseases (e.g. COVID-19), increased land use, and mass extinctions, this issue's main topics – January 7th's "Global Nature Watch" (p. 12), and February 4th's "Invasive Species in Nova Scotia" (p. 14) – are about ways we naturalists and citizen scientists can and must become involved in the business of helping to preserve a healthy and viable planet. One important thing most of us with iPhones and computers can easily do is to increase our search hours for close-ups of every bit of flora and fauna we can, *especially* the less popular such as insects and fungi, then uploading them to iNaturalist to be included in global databases which will help NGOs and governments to make effective legislation as soon as possible.



NEW GUIDE TO ONTARIO MOTHS



from Verna J. Higgins,
Friends of Thicket's Woods Newsletter.

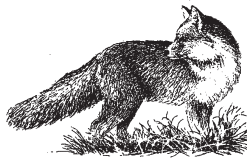
Some HFN members may be interested in a new, illustrated checklist of Ontario moths prepared by Ontario's best – David Beadle, Michael King, and Phill Holder – "Ontario-Moths - A Checklist", Hawk Owl Publishing, 2020.

All published records and private collections have been researched for it. The outcome is the first complete and most up to date Ontario checklist of the 3,187 verified moth species recorded there. The main checklist includes photographic plates with examples of the family of each species. Separate sections include photographic additions to the list and a few records awaiting verification. All include dates, locations, and finders' names, with more than 230 photographs, and is spiral bound for easy use. Order your copy from www.mattholderfund.com/shop, \$25.00 inc HST.



eNATURE NOTES

Lesley-Jane Butters On July 18th Lesley was driving Hwy 1 to Wolfville. At Avonport Discount Centre the sun had just set when out of the ditch leaped a **jet black Fox Vulpes vulpes** with its characteristic white-tipped bushy tail – directly in front of her vehicle! Thank goodness for brakes. For such a marvellous sighting, she so wished she had had her camera at the ready. On October 21st at Albany New, two hours before sunset it was still 23°C. Suddenly, a **massive swarm of Asian Lady Beetles *Harmonia axyridis*** emerged, absolutely invading the landscape, some flying, some crawling into tree bark crevices, some almost obliterating her van; she had to slap at those in her hair, even though she knew they could bite and excrete an acrid odor if agitated. She wondered where this beetle invasion would overwinter.



Carol Klar In late December Carol sighted **both Barrow's and Common Goldeneye** in good numbers in the Bedford Basin; a **Belted Kingfisher** was also sighted. A trip to Peggy's Cove netted **several gorgeous Harlequin**

Ducks tossing about in the surf to the right of the light-house, and also **a few Long-tailed Ducks**. A little further on were **two Common Loon and Common Eider**. **A mature Bald Eagle** was spotted at Shaw's Landing near West Dover; on the way home **numerous Bufflehead** were sighted close to shore near Indian Point Rd. A close-up look at the **resident male Wood Duck** and **three female Green-winged Teal** were found at Frog Pond.

In early January, **both White-winged Scoter and Black Scoter** were seen in the ocean off Shore Drive in Eastern Passage, plus **a pair of Common Eider and a Black Guillemot** in its beautiful white and black winter plumage. On the drive home, **20 Canada Geese** were noted in a field.

Mid-January **a pair of Lesser Scaup** were sighted at Sullivan's Pond in Dartmouth as well as **a Ring-necked Duck** among the **many Mallard** and the **fewer Black Duck** there. A male and female of one of our most beautiful ducks, **the Northern Pintail**, have made Shubie Park in Dartmouth their home for the last month among the many Mallards few Black Ducks. **A tiny Dovekie** was spotted bouncing in the ocean near Herring Cove, as well as **a mature Bald Eagle**. Morash Pond in Dartmouth is home to **a female Wood Duck**.

In late January, in the North West Arm near the Dingle Tower, **13 Red-breasted Merganser (six male and seven female)**, and **two Black Guillemot** were noted. And finally, in Purcell's Cove, **two pairs of the beautiful Long-tailed Duck** were seen diving.

Grace Beazley After Christmas, Grace's winter arrangement in a vase with water containing pine, hemlock, larch, and Alder (with female cones and tight male catkins) began dropping a yellow powder; looking closely, she saw the 'tight' catkins were opening. Over a number of days, they turned yellowish and grew longer. She had to continue dusting away the pollen every day.

At mid-afternoon on January 19th, she and Richard heard the caw-caw-cawing of **Ravens** in Point Pleasant Park, they then saw five or six of them high up in a tall snag. Within seconds more came flying in overhead, landing on any available branches; then, even more arrived! In total, about a dozen or so. Then they all flew off, presumably to roost for the night.

Gareth Harding Gareth reported **a pair of Saw-whet Owls** setting up house in Point Pleasant Park. They'd started calling a week and a half before February 18th, when he heard them again. They're calling from a line between Shore Battery up through Cambridge Battery, Martello Tower, and the Chain Rock Drive entrance. They start at dusk and should be easy to locate from their repetitive call.



NEW AND RETURNING

Rebecca Parker & Jason Bond
Paul Tubitt
Eve Williams



SPECIAL REPORTS

YEAR END REPORTS

FROM THE PRESIDENT

At the 2020 Annual General Meeting, we were still looking forward to a regular year of activities, and we were planning to co-host the Nature Nova Scotia Celebration of Nature in Halifax. Two weeks later, all our plans were put on hold.

Fortunately, the situation in Nova Scotia improved over the Summer. Taking a window of opportunity in early fall, we were able to squeeze in a few field trips and met twice in the Public Gardens. However, with indoor in-person meetings still many months in the future, in January we offered our first on-line presentation, and plan on keeping it up until we are again able to assemble in our regular space at the Museum of Natural History.

Even though the outlook for this year is still fraught with uncertainties, the program committee will start planning outdoor events for our members, public health restrictions permitting. Another event to be looking forward to will be Nature Nova Scotia's Celebration of Nature that HFN will be co-hosting in 2022.

More detailed upcoming reports will give updates on our finances, our membership status, our program activities, the newsletter, and our conservation involvement.

I want to finish by expressing my thanks to the many people who are keeping our society going. Without these many helping hands, our activities would not be possible.

I am looking forward to a year with more outings and meetings than last year.

*Respectfully submitted,
Burkhard Plache, President*



CONSERVATION

On behalf of HFN, we submitted comments to Lands & Forestry in response to their High Production Forestry (HPF) Discussion Paper, titled "Need for Biodiversity Landscape Planning before finalising HPF and Ecological Matrix components of the Triad, and for caution in selection of HPF sites in acid-stressed watersheds. A response to the High Production Forestry Phase 1 – Discussion Paper From the Conservation Committee of the Halifax Field Naturalists, March 31, 2020". ('Triad' is the division of forested lands into zones of Conservation; High Production; and Ecological Matrix). We also drafted a letter of support for Sandy Lake/Sackville River Regional Park Coalition's submission to the Halifax Regional Planning RP+10 Review. It was then sent by HFN President Burkhard Plache to the Mayor and Councillors.

Individually, members of the committee have remained active in conservation-related matters throughout the past year. Occasionally we share requests for letters of support or for signing petitions on provincial conserva-

tion issues for circulation to members or to be posted on the website (such the Avon River Causeway and the Moose Blockade).

We are obviously very pleased that the Nova Scotia Supreme Court ruled in favour of HFN/the Blomidon Naturalists/East Coast Environmental Law versus NS Lands & Forestry, in that they must honour their own commitments to protecting Species-at-Risk.

*Respectfully submitted, Heather Leslie,
David Patriquin, Clare Robinson*



COLIN STEWART CONSERVATION AWARD

This award was supposed to have been granted posthumously to pioneering lichenologist Dr. Wolfgang S.G. Maass (1929-2016) at our AGM in March, 2020. However, it did not take place at that time. So – we are very pleased to announce that, with his family attending, it was awarded at this March 4th's HFN Zoom AGM.

Dr. Maass's work led to the first lichen in Eastern Canada to be designated as endangered under the Species at Risk Act (SARA) and the first lichen to be listed in Nova Scotia under the provincial Endangered Species Act (ESA). His decades of data was the foundation which led to the listing of other lichen species both under SARA and ESA; this pioneering work in lichen conservation sparked initial efforts to protect these vulnerable species.

In the early 1980's, he began searching and documenting the locations, habitat, and populations of very rare lichens in Atlantic Canada. He published several scientific papers describing habitat and distribution of Boreal Felt Lichen and other rarities. These publications became the basis which enabled these species' first listings. His seminal paper on Boreal Felt Lichen entitled "*Erioderma pedicellatum* in North America: a case study of a rare and endangered lichen," was published in the "Proceedings of the Nova Scotian Institute of Science", and was one of the first extensive studies of rare lichens and their conservation in northeastern North America. It paved the way and laid the foundation for further status reports commissioned by COSEWIC (Committee on the Status of Endangered Wildlife in Canada). Other rare lichens about which he authored or co-authored papers include Vole Ears lichen *Erioderma mollissimum*, *Hypogymnia* (Cavernularia) *hultenii*; *Pannaria lurida*, and *Moelleropsis nebulosa* subsp. *frullaniae* – a new subspecies which he discovered in both Nova Scotia and Newfoundland. It was Wolfgang's decades of field work which enabled not only these species to be assessed, but also paved the way for the emerging and fledgling efforts at lichen conservation in both NS and Canada.

**Halifax Field Naturalists
Balance Sheet
December 31st, 2020**

| | | |
|---|--------------|---------------|
| Assets | | |
| Bank Account | 1,641 | |
| Accounts Receivable: HST Rebate | 250 | |
| Investments | 8,774 | |
| Pins | 515 | |
| Butterfly & Dragonfly Lists | <u>123</u> | |
| | 11,303 | <u>11,303</u> |
| Liabilities and Surplus | | |
| Liabilities | | |
| Accounts Payable: Nature Nova Scotia | <u>255</u> | 255 |
| Surplus | | |
| Restricted: Endangered Species and Spaces | 2,774 | |
| Unrestricted (end of year) | <u>8,274</u> | |
| | 11,048 | <u>11,048</u> |
| | | <u>11,303</u> |

**Halifax Field Naturalists
Statement of Revenue and Expenses
January 1st to December 31st, 2020**

| | 2020 Actual | 2020 Budget | 2021 Budget |
|--|------------------------|------------------------|------------------------|
| Revenues | | | |
| Membership Funds | 2,515 | 2,710 | 2,600 |
| Interest | 39 | 39 | 42 |
| Donations | 30 | 50 | 50 |
| Sales (Pins, Lists) | <u>0</u> | <u>10</u> | <u>10</u> |
| | 2,584 | 2,809 | 2,702 |
| Expenses | | | |
| Meetings | 0 | 333 | 240 |
| Field Trips | 0 | 0 | 0 |
| Newsletter Production | 821 | 1,000 | 1,000 |
| Newsletter Distribution/Mailing | 582 | 840 | 740 |
| Memberships & Fees | 236 | 236 | 236 |
| Socials | 0 | 0 | 0 |
| Grants, Donations | 0 | 0 | 0 |
| Special Projects | 0 | 0 | 0 |
| Insurance | 255 | 240 | 255 |
| Internet Service | 209 | 130 | 200 |
| General Supplies & Expenses | 33 | 0 | 0 |
| Bank Fees | <u>32</u> | <u>30</u> | <u>31</u> |
| | 2,168 | 2,809 | 2,702 |
| Net Income | 416 | | |
| Unrestricted Surplus, beginning of year | 7,858 | | |
| Unrestricted Surplus, end of year | 8,274 | | |

*– Respectfully submitted,
Ingrid Plache, Treasurer*

Wolfgang's collections are still being used today to assess even more species. The Nova Scotia Museum of Natural History's Lichenologist and Botany Curator Dr. Sean Haughian reports they are currently working through these collections – approximately 6,500 specimens of sphagnum and associated bryophytes – which came in to the Museum in 1987. About 1/3 of these specimens were collected in Nova Scotia, and the rest largely from the Pacific Northwest. These important collections are the largest in Atlantic Canada, and will form the basis for much needed conservation work on peat mosses going forward.

Dr. Maass was part of the first team to assess the conservation status of lichens in Nova Scotia overall; his extensive knowledge of our provincial lichens made a significant contribution to this process. His work continued well into his retirement. He was always willing to impart his extensive knowledge to others and always volunteered his time when asked to venture into the field. His work, on a shoe-string budget or with no funding at all, especially in his retirement, was all done at a time when no one else was studying these rare species. He also studied the effects of air pollution on lichens and these extensive collections are not only in the Nova Scotia Museum, but also the New Brunswick Museum, and the Canadian Museum of Nature.

His many years of work not only led to endangered designations for the Boreal Felt Lichen and Vole Ears Lichen, but also to the assessment and subsequent designations on numerous other rare and vulnerable species. These include Blue Felt Lichen, *Degelia plumbia*, Black Foam Lichen *Anzia colpododes*, and Wrinkled Shield Lichen *Pannaria lurida*.



PROGRAM

The first quarter of 2020 proceeded as usual with a successful field trip and talk each month, including the annual HFN AGM with slide presentations in March.

Our March 9th committee meeting was held at the Sobeys store on the Bedford Highway and was chaired by Clarence Stevens Jr. Numerous field trips and talks which had been discussed at our earlier December 2019 committee meeting were discussed again, and dates were set for the next several months.

We had a successful March 14th field trip to Hope for Wildlife arranged by Denyse Contrasty with a total of 17 participants. Soon after – the country went into lockdown with the pandemic. All the talks and field trips from mid-March 2020 and over the summer were unable to proceed due to the necessary provincial travel and outing restrictions.

September However, on Thursday September 2nd at 6:00 p.m., with Burkhard Plache officiating, approximately 20 HFN members came together informally for our usual 'monthly' meeting, but – at the Public Gardens, wearing masks and socially distancing. There it

was decided, with sufficient interest expressed, that the Shubenacadie Wildlife field trip which had been arranged for earlier in the year could proceed but with only a limited number of 10 (HFN members only). This September 19th evening trip led by two Wildlife Park guides was a great success, and with an eager waiting list, two weeks later, another took place. The last meeting of the year for the Program Committee was hosted at Bernie McKenna's home on Sept. 24th. A previously cancelled Noel Shore geology field trip which had been scheduled for Fall 2019 took place on Sept 26th, with its original 20 HFN registrants.

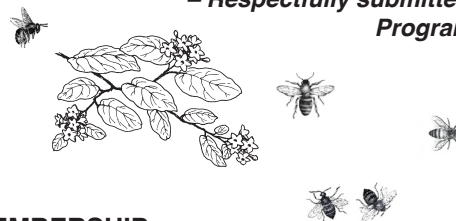
October A second 'monthly' HFN meeting took place on Thursday, Oct. 1st at the Public Gardens, officiated by Ingrid Plache.

November On Nov 7th the Friends of Blue Mountain-Birch Cove hosted a field trip into Susie's Lake for 20 HFN participants. And on November 15th, Burkhard Plache offered and led a field trip to Spryfield's McIntosh Run for 10 HFN members.

There have been no further meetings of the Program Committee since September 24th due to the uncertainty of when talks and field trips will be able to resume during the pandemic.

Thanks to all the members of the Program Committee – Mille MacCormack, Bernie McKenna, and Chair Clarence Stevens Jr., and to our president Burkhard Plache for his valuable guidance. With the promise of a COVID vaccine for all Canadians by the Fall we look forward to a time when we can once again participate together in HFN events.

– Respectfully submitted, Carol Klar,
Program Committee



MEMBERSHIP

In 2020 our figures indicated we collected dues for one Student, 50 Individual, 33 Family, 23 Supporting, and four Institutional memberships. We also had two Complimentary memberships for the year. Adding these to one Life membership resulted in a total of 113. It should be noted that these figures represent memberships, not 'members', as additional members included in the Family category are not tabulated. Twenty-four memberships were new, and forty-four included a Nature Nova Scotia membership.

Our Facebook followers number 1,885, with an unknown number of Twitter followers.

A special thanks to Doug Linzey and Bernie McKenna for all their help with membership-related tasks.

TOTAL MEMBERSHIPS BY YEAR:

| 2011/12 | /13 | /14 | /15 | /16 | /17 | /18 | /19 | /20 |
|---------|-----|-----|-----|-----|-----|------|------|-----------|
| 119 | 107 | 109 | 114 | 129 | 146 | 115* | 123* | 113* 113* |

*Based upon memberships received. Years prior to 2017 were reported as membership numbers at the end of December.

– Respectfully submitted, Ronald Arsenault
Membership Secretary

NEWSLETTER

Our 2020 issues – Spring #178, a combined Summer/Fall #179/180 (due to COVID), and Winter #181 – comprised 40 pages. During 2020, DalPrint increased its charges again, so we now use ePrintit, who can do both the colour covers and the black and white interior pages all under one roof, and – less expensively.

Spring #178 bloomed with COVID explanations and effects – on the newsletter, our presentations and trips, and list of Organisational Events (none). Sadly announced was the passing of two naturalists – long time HFN member Jean Salisbury, who especially enjoyed *all* of our Waterfall Hikes – and dragonfly/damselfly expert Paul Brunelle, who left a legacy of meticulous collections, the discovery of a new species in 2000, and the assurance of accuracy in HFN's 2017 "Dragonflies of Nova Scotia Field Check List". Eagerly awaited is his "Atlas of the Dragonflies and Damselflies of Maine and the Maritimes". HFN joined the Blomidon Naturalists, Nature Nova Scotia, and East Coast Environmental Law to file for a Judicial Review of NS Lands and Forestry's failure to uphold its mandatory duty under the Endangered Species act, to whit – to protect our 'At Risk' plants and animals. **Submissions:** A travel piece on the "Mighty Mississippi" by Pat Leader; Timothy Frasier's "Northern Right Whales" talk; Ron Arsenault's extremely informative "Amphibians of NS" talk; Burkhard Plache's "Susie's Lake Hike"; Greg Baker's "St. Mary's MP-SpARC Lab" trip; Nature Notes; a sadly reduced Almanac; and our Spring Halifax Tide Table rounded out that issue.

Summer/Fall #179/180 More moans about COVID effects and restrictions, and the announcement of the handy pocket guide "Wildflowers of Nova Scotia" by the Blomidon Naturalists. HFN sent off a 'letter of support' to HRM' about the preservation of Sackville River/Sandy Lake Regional Park. We paid tribute with an 'In Memoriam' for Honorary HFN Member Ursula Grigg, ostracod authority and a past editor of this publication. Regina Maass initiated a much-needed article about the environmental downsides of holiday Fireworks Displays; and Gillian Webster recounted her wonderful June, August,

and September trips to the Tatamagouche area. Our NSMNH HFN Photo night (March 5th - no restrictions still) showed travel images by Stephanie Robertson, mushrooms by John Crabtree, Haida Gwaii trip images by Richard Beazley, west-coast animal pics by Peter Webster, and Seal Island trip pictures by Burkhard Plache. **Submissions:** An always enjoyable and informative "Hope For Wildlife" trip account by Denyse Contrasty, and the first installment of a Shubenacadie Wildlife Park trip (with all its wonderful animals in such a beautiful setting) by Stephanie Robertson, were shared. A list of HFN events was added to our Almanac as the still fairly warm weather enabled two HFN monthly meetings outside in the Public Gardens and also two Shubenacadie Wildlife Park Trips, with adherence to COVID restrictions being followed.

Winter 2020/2021 #181 Submissions: A very thorough review of "Mammals of Prince Edward Island and Adjacent Marine Waters" by Ron Arsenault; Lesley Jane Butters recounted some surprising and very welcome wood-removing assistance by local Beavers at Albany New; Pat Leader told of Cormorants in distress in Bedford Basin due to lazy fishermen leaving hooks and entangling fishing gear everywhere. Stephanie Robertson's account of the first Shubenacadie Wildlife Park trip concluded, and Gillian Webster gave an extensive report on Rob Fensome's September 26th's Noel Shore Geology Trip, along with an always valuable list of bird species seen. We were invited to take part in a 2020 Global Bird Backyard Count, by Canadian Coordinator Kerrie Wilcox. Nature Notes, our useful Almanac (with one N.S Bird Society event listed), and the Winter Tide Table concluded this issue.

My thanks to Patricia Chalmers for our Almanac; to Alan Robertson, Patricia Chalmers, Carol Klar, Ingrid and Burkhard Plache, and many others for much appreciated proofing; and to ePrintit for exceptional printing services and our new reduced rates.

– Respectfully submitted,
Stephanie Robertson



SPECIAL ARTICLES

ORCHIDS NEED FUNGI

[First printed in the Spring 2020 Issue of the "The Nova Sclerotium", the electronic mail-out of the Nova Scotia Mycological Society]



– John Crabtree



What follows is my love, hate relationship with the Orchid *Platanthera orbiculata* var *macrophylla*, 2007-2013.

I have a lifelong love of the outdoors and all that it has to offer. I became interested in mushrooms over thirty-five years ago and it has remained an enduring passion. In about 2000 or 2001 I purchased a Fuji Finepix, 2.2 megapixels digital camera. I don't recall all the technical details about it but what I do remember is that I bought



it from Wacky Wheatley's in Truro for the outrageous sum of \$550 plus tax. It was expensive, but I had to have one so that I could photograph all the mushrooms that I had seen over the years. After my expensive purchase I could not wait to visit some of my favourite trails. In the spring, equipped with my new camera, I ventured in to the woods and found very little in the way of mushrooms. While looking for mushrooms I started to notice wild flowers, and lots of them. So began my interest in Nova Scotia's wildflowers.

Over the years I have found, identified and photographed over 320 species, as well as over 280 species of mushrooms. On September 5th 2007, I, along with a friend, visited one of my favourite mushroom trails in

the Whitehill area of Pictou County. During our walk we came across what I believed to be *Platanthera orbiculata*, an orchid. There was not one plant but two, about 50cm (20 inches) apart. *P. orbiculata* is very distinctive because of the two dinner plate sized basal leaves. It was in seed at the time, so I took numerous photographs and promised myself to read up on this rare and beautiful orchid. At the time I knew that orchids had a relationship with fungi but my knowledge of this relationship was sketchy. Before leaving for home I took a GPS fix and vowed to return the following spring. Once home I consulted a book authored by Carl Munden, "Native Orchids of Nova Scotia" published in 2001 by the University College of Cape Breton Press. This book gave me all the information that I needed for my next visit the following spring.



- In the spring of 2008 I returned to the site.
- One orchid was about 10cm (4 inches) high but the other was only showing its leaves. Unfortunately the one that was 10cm high had apparently been trodden on by some unknown animal and did not survive the trauma.



- In 2009, 2010 and 2011 I paid "my orchids" regular visits and both plants produced the tell-tale dinner plate sized leaves, but nothing else, no stalk, no flowers.



- Almost resigning myself to defeat I headed off into the woods on 29 May 2012 to visit "my orchids". To my delight both orchids were about 10cm (4 inches) high. Thereafter I visited on 15th June, 29th June, 7th July and finally on 13th July (Friday 13th!!!) I was rewarded for my patience with both individuals being in full flower. One individual being approximately 45cm (18 inches) high the other about 33cm (13 inches) high.



- I next visited "my orchids" in late May of 2013 with totally unexpected results. No leaves, nothing, absolutely nothing! It was as if they had never been there.

This greatly puzzled me and I sought out information that would explain this phenomena. I approached, in person and via e-mail, several very knowledgeable people but no one could offer an explanation. I searched the internet but had little success. Frustrated, I put my "orchid project" on one side and forgot about it for several years.

The years passed but the puzzle of *P. orbiculata* never left my thoughts. Determined to come to a conclusion that satisfied my curiosity I again took up the search for more information. I searched the internet and came across more information that gave me more of an insight into the world of *P. orbiculata* var. *macrophylla*.

Orchid seeds are so small that they could be described as being almost like dust, being between 0.3mm (0.012 inches) and 0.5mm (0.02 inches) long. The seeds contain no endosperm so they must obtain their nourishment from elsewhere; this is where the fungi come in to play. I discovered that two species of mycorrhizal fungi, *Leptodontium orchidicola* and *Sebacina* sp., both of which are wood decaying fungi, are reported to associate with mature *P. orbiculata* plants (Currah et al 1990). The fungal-orchid relationship is complex. The fungal hyphae grow within the root cells and transfer nutrients such as phosphorous, nitrogen, and water to



the root cells. Other contributions to the orchid by the fungus include sugars, amino acids, vitamins, proteins, peptides, and phosphates, (see citations in Arditti et al. 1990). The fungus benefits by receiving carbon from the orchid (Dearnaley 2007). The mycelium also links orchids with neighbouring trees from which they, indirectly, receive carbon. *P. orbiculata* has a very poor germination success rate (Smreciu and Currah 1989). Also, a high mortality rate is common amongst *Platanthera* seedlings (Zettler et al. 2005). On the rare occasion that germination is successful, less than 3% of seeds develop into leaf-bearing seedlings (Smreciu and Currah 1989).

When I first came across *P. Orbiculata* in 2007, it was in seed and it promised to flower again in the spring of 2008 had some unknown animal not trampled on it. This is borne out by (Cleavitt et al 2016) who followed several populations and found that it was most likely to flower in successive years. From various reports, Reddoch and Reddoch (1993) concluded that it is the moth, *Diachrysis balluca* that is responsible for pollination.

The defining moment.

In summary, I discovered that mature plants in the vegetative stage produce two large leaves and can flower, remain vegetative, or go into dormancy the following year (Reddoch and Reddoch 2007). This dormancy can last for one or several years. When I discovered this I realised that had I followed *P. orbiculata* in the years following 2013 I would possibly have observed more of the life cycle of this truly amazing plant. I regret that I missed the opportunity to learn more about "my orchids".

Sadly, it has been estimated that most individuals die by the age of ten, while less than 5% of individuals survive to the age of twenty. (Cleavitt et al. 2016).

"Adopt the pace of nature. Her secret is patience" – Emerson.



CANADIAN BAT BOX PROJECT

Karen Vanderwolf, PhD candidate at Trent University, Ontario, is leading a Canadian bat box project in partnership with the Wildlife Conservation Society and the Canadian Wildlife Federation. She sent us the following information hoping to glean some Canadian citizen-science bat box data, to encourage people to install bat boxes, and to share any bat-related observations. If you already have a bat box, she wants to know about it!

Despite very little available general information about Canadian bat boxes (nor which are the best designs for our northern climate), there *are* existing, unpublished datasets on bat box usage and microclimate from some provinces, and Karen plans to assemble these existing datasets and generate new data for a peer-reviewed publication.

Bats in Canada face multiple threats from habitat loss and disease. As towns and cities expand, the large, old trees which bats prefer and call home are being cleared, so bats are losing their roosts. They need a warm and secure place during the day in the summer, and bat box-

es are a simple and effective way to provide additional roosting habitats for them. This is especially important in Canada, as three of our bat species are listed as endangered – Little Brown Bats *Myotis lucifugus*, Northern Long-eared Bats *Myotis septentrionalis*, and Tri-coloured Bats *Perimyotis subflavus*. Sadly, bats now face additional persecution due to worries about COVID-19. But **North American bats cannot carry the COVID virus;** (go to the Canadian Wildlife Federation’s Website, and enter “Should I Be Worried About COVID-19 and Canadian Bats?”)

Which bats will use bat boxes? Out of our 18 Canadian species, 13 have been documented using bat boxes, but this is American bat box data about American bats; we need bat box data from Canada. The current recommendations on bat box design are based only on research in the United States, especially Texas, (and also Europe). Since any box design bats might prefer varies by region and species, more information on bat boxes in Canada is urgently needed. There is very little previous research about which bat species prefer which bat box designs here. All that *is* known is that Little Brown Bats use bat boxes throughout Canada; Big Brown Bats use boxes in some parts of Canada; and Yuma Bats use boxes in British Columbia.



YOU CAN HELP!

This research seeks to determine exactly which bat species use bat boxes across Canada, which box designs are preferred by which bats, and which temperatures bats prefer for roosting in our northern climate. To accomplish this, we need to know where bat boxes are located in Canada, the physical characteristics of the boxes, and whether they are being used.

Why install a bat box? Installing a bat box gives bats an alternative to roosting in your house, and since all bats in Canada eat only insects, you may even notice a decrease in the insect population around your property. Bats eat a variety of insects, including mosquitos, and agricultural and forestry pests. Also, you will be able to watch bats swooping around your backyard at dusk catching insets in midair.

You can tell whether your box is being used by bats by searching for guano underneath it, and by watching your box at sunset in June to count any bats as they emerge for an evening of eating insects. You can also shine a light up into the box during the day to see if there are bats inside (from May to October in Canada. The boxes will be too cold for bats during the winter).

You can see a good video of bats flying out of bat boxes in Prince Edward Island at ‘**Bat Emergence Count Prince Edward Island - YouTube**’.

How do I get bats to use my box? Not all bat boxes will be occupied in the first year after installation. Occupancy depends on many factors, ranging from the period in which it was installed to the fact that bats are very selective and might need a little time to familiarise themselves with your box. There are no lures or attractants,



such as guano, which will bring bats to a box, although larger bat boxes with multiple chambers more commonly attract bats than smaller boxes.

Bat boxes are most successful when attached to houses or poles as opposed to trees. Trees shade the box and can block access to the box entrance. If bats are not using your box after two years, try moving the bat box to a new location. Bat boxes need to have warm temperatures that bats like (but not too hot as even in Canada some bat boxes get too hot during the summer, which can increase bat mortality). Temperatures of over 40°C are too hot; temperatures in some bat boxes in Canada have been recorded over 50°C!

Karen’s research group measures the temperature inside bat boxes using ‘temperature loggers’ which can take a reading every hour over the whole summer. One way to ensure that bats can choose their preferred roosting temperature is to install multiple bat boxes as they will vary in degree of heat depending on how much direct sunlight they receive. Participants will be sent temperature loggers to install in their boxes, and also supplies to collect guano (bat droppings – bat species can be identified from their guano).

If you have a bat box or boxes and would like to participate, please fill out an online multiple-choice bat box survey. Your participation is very important, even if your box has no bats. The survey can be found at <http://blog.healthywildlife.ca/canadian-bat-box-project/>; just follow the text down to the survey invitation. More information about which box designs bats use in Canada will help bat conservation by providing recommendations for improving effective bat box design for our northern climate.

If you know anyone with a bat box, regardless of whether the box is known to have bats, please encourage them to fill out the survey. If you have an existing unpublished dataset, or wish to collaborate with us on this project, please contact Karen Vanderwolf at kjvanderw@gmail.com.



In Nova Scotia, **The Annapolis Valley Bat Box Project**, under the leadership of Acadia Students Zackery Pate and Taryn Muldoon, are distributing bat boxes throughout the province to help support existing bat populations. This project, which also partners with the Canadian Wildlife Federation, aims to engage the community in learning about bats while also supporting conservation in a concrete way. These volunteer-built boxes are available to those who have space on their properties by contacting annapolisvalleybats@gmail.com, or by messaging the Annapolis Valley Bat Box Project on facebook. In addition to building bat boxes, Zackery and Taryn also created an educational webinar with bat experts from across North America, a recording of which is viewable on their facebook page or by request through their email. They are currently planning a project which aims to involve high school students in building bat boxes while learning about bat conservation.

HIMALAYAN BALSAM ARRIVES IN NOVA SCOTIA

– Marianne Scholte,



About ten years ago, I was offered for sale from a farmer in Middle Musquodobit a lovely pink-flowered plant identified as 'Bee Balm'. I planted it in my Halifax garden (we live across the street from Point Pleasant Park which will be relevant later in this piece), and found to my delight that it did indeed attract a plethora of bees. However, not to my delight, next year it had spread extraordinarily. But they were very easy to pull up, and I got all of them out without much effort. The next year I may have had one or two plants, but they also were easy to pull, and as of now, they are still no more. I realised back then it was related to the popular annual *Impatiens*, as it had the same curly looking seed pod which explodes open when disturbed. With the following submission from Marianne Scholte, I realised its true identification was Himalayan Balsam *Impatiens glandulifera* Royle, otherwise also known as Poor Man's Orchid or Policeman's Helmet. Ed.

Himalayan Balsam *Impatiens glandulifera* has been 'escaping' from gardens since 1839, when John Forbes Royle, former curator of the East India Company's Saharanpur botanical gardens in northern India, gave his specimens to the Royal Botanic Gardens at Kew in London. Fifteen years later, this fast-growing, bamboo-like annual with purple and reddish stalks and pink, purple, or white flowers, was found throughout the English countryside; by the turn of the century it had infested wide swathes of Europe and had begun to spread across the United States and Canada. And, some five years ago, it arrived in my garden in Cow Bay, Nova Scotia.



In England, this elegant Indian import had become a staple of the 'wild woodland gardens' promoted by William Robinson, the celebrity gardener who rebelled against manicured British flowerbeds, promoting gardens of broad swathes of bright flowers in a less tidy and more natural manner (the precursor of today's English cottage gardens).

Exotic plants, including goldenrods and asters from North America, chinese lilies and wild roses, Japanese Knotweed and anemones, rhododendrons from Spain and North India, Giant Hogweed from the Caucasus, and Himalayan Balsam from the central and western Himalayas, were all part of the horticultural extravaganzas which 19th century Victorians created around their country homes. Seeds were obtained either directly or indirectly (via commercial nurseries) from the Horticultural Society of London, which imported seeds from, among others, the East India Company.

Unfortunately, some of the imported exotics grew too well. Himalayan Balsam (which belongs to the Touch-Me-Not family) literally exploded into areas surrounding the country gardens where it had been planted; it reproduces through seed-pods which forcefully erupt when they are ripe, throwing their seeds up to seven metres. A single plant can reach heights of three metres, producing on average 700-800 (and up to 2,500!) seeds. A thick patch of young seedlings emerges early the following spring and crowds out other plants.



Where it contacts water currents, spread is even faster. The negatively buoyant seeds are carried downstream, sometimes for long distances, when they become lodged, then germinate, in a muddy bank, starting the cycle all over again. Thus it rapidly establishes itself along waterways,



where it is the greatest threat. Not only does it out-compete native species; when dense stands die off in the fall, its hollow stalks quickly rot, leaving large areas of river and lake banks exposed and highly susceptible to erosion.

By 1855 Himalayan balsam was found throughout the English countryside; it continued to spread so rapidly it was given weed status in 1898. Today, it is completely naturalised throughout riparian and open-wooded habitats in most of lowland England, Wales, Scotland, Ireland, and even in the Channel Islands. In 2010 *Impatiens glandulifera* was included in Schedule 9 of the UK 1981 Wildlife and Countryside Act, making it illegal to allow or cause the plant to grow in the British countryside.

Himalayan Balsam has its defenders – in particular British beekeepers who value its high levels of nectar in late fall when other sources are scarce, claiming it can be crucial in helping them survive over winter. The British Beekeepers Association advises keeping a few bushes, being careful to ensure seeds don't escape to the countryside. Its successful global spread makes it doubtful this is possible. It did not stop at the UK border, but quickly spread to Europe. By the 1900s it was common in southwest Germany, where it spread via the Rhine River; by the mid-1900s, it was found throughout Scandinavian countries. Today, it is found in 27 European countries, New Zealand, Japan, and the Russian Far East. It is present in 11 US states and invasive in six. In Connecticut, it has been illegal since October 2004 to move, sell, purchase, transplant, cultivate, or distribute the plant, according to US Public Act 04-203.

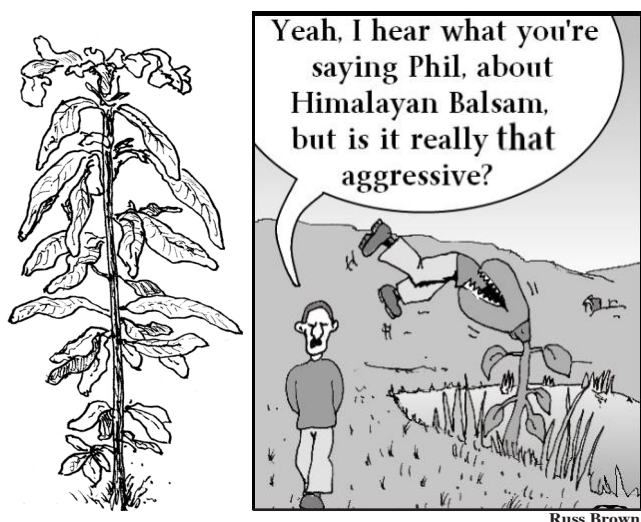
This plant was likely introduced to Canada as an ornamental. Its first documented sighting was in Ottawa in 1901. It quickly spread to much of southern Ontario, gaining a foothold in many watersheds; it's listed there as a Category 1 "invasive species which can dominate a site to exclude all other species". It's in seven other provinces – British Columbia, Manitoba, Quebec, Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland. However, it is far from reaching its potential climatic range here, given its ability to thrive in a wide range of soil and light conditions and in relatively cool climates (there are frequent sightings in Alaska!).

Since the 1990s, there have been large-scale attempts to remove it, particularly in British Columbia, Alberta, and Ontario. It's found predominantly in southern BC, southern Vancouver Island, Fraser Valley, and Metro Vancouver. Spreading rapidly, it's threatening many sensitive riparian habitats important for salmon; it's listed on BC's Invasive Plant Alert List. There are thick patches along many of Alberta's waterways; between 2014 and 2018, over 100 volunteers pulled nearly 8,000² metres of it from the Kennedale Ravine in Edmonton. In 2009, at Pigeon Lake, Alberta, the local community removed plants which had spread halfway around the lake, around 25 kilometres. It is listed as 'prohibited noxious weed' under the Alberta Weed Control Act and as a 'prohibited species' under the Fisheries (Alberta) Act, making it illegal to sell, import, transport, or possess. Penalties can be up to \$100,000 and/or a year in prison!

The first recorded sighting of Himalayan Balsam in the Maritimes was in 1937, in vacant lots in New Glasgow. In 1943, it was also found in St. John, NB, where seeds may have arrived attached to ships' ballast. According to the Atlantic Canada Conservation Data Centre, it was repeatedly found in southern NB during the 1960s, 70s, and 80s – in

Fredericton, Deer Island, St. Andrew's, Campobello Island, and Black's Harbour, among other places. Although there is a data gap in the 1990s, the 2000s show more sightings in NB and two in NS – along the Middle River in Pictou, and in Hammond's Plains, HRM. The data for the last five years, primarily from the smart phone app iNaturalist, show that the plant has now fully arrived in Nova Scotia; it has been sighted, among other places, in Sydney, Inverness, Pictou, Amherst, Truro, Wolfville, Annapolis Royal, Digby, Brier Island, St. Margaret's Bay, the McIntosh Run watershed, and throughout HRM, where it is listed as an invasive species.

I had never heard of Himalayan Balsam until my neighbor purposefully strode into my field in mid-July and yanked out a two-metre-tall blooming plant. "The dreaded Himalayan Balsam", he announced. "Say what?" I had been on the lookout for 'dreaded' goutweed and Japanese Knotweed since I had moved in a few months previously, but Himalayan Balsam?



Discussions with other neighbors revealed the plant has been spreading from garden to garden in my corner of Cow Bay for the last 10 years or so. I needed to move it immediately; it was in bloom and would soon be spewing seeds metres away from each plant. I donned my gloves (it can induce allergic reactions) and with the help of my neighbor, began to pull – and pulled, and pulled, for days on end! You *have* to pull it, I learned; if you simply cut it, it will form new shoots with new flowers and new seed pods at a lower stem node. The official recommendation is to place all pulled plants into black bags, leave them in the sun to kill off the seeds, then place the remains into the garbage (*not* into your green bin) or – burn the remains. That turned out to be highly impractical, as I had literally thousands of plants to dispose of.

Those people of Pigeon Lake who had removed Himalayan Balsam from 25 kilometers of their shoreline had come to the same conclusion. So they pulled them up by the roots, broke the stems a couple of times, then let them lie. This worked quite well; by and large, they did not reemerge the following year at the site where they had been left.

You must reach the plants before seed pods have formed – if too late, you have to carefully place a bag over the seedpods before pulling. Weather also plays a role; it's best to pull when there is no rain forecast, or the pulled stems can form new adventitious roots along lower stem nodes if there is moisture near the ground.

If Himalayan Balsam has reached Cow Bay, how bad is it in the rest of Nova Scotia? Not so bad, it turns out – as of yet. According to Prof. Jeremy Lundholm, Biology Department Chair at St. Mary's University and an expert on community level plant ecology – several other invasives, including Japanese Knotweed, *Rosa multiflora*, and *Phragmites* spp. (invasive wetland reeds) comprise far more serious problems for NS. However, he notes he and his family personally pulled Himalayan Balsam from a 20 x 20 metre area of Point Pleasant Park some 10 years ago "because it is easy to remove a small infestation and it will grow to a big problem if you don't." [*did it come from my garden perhaps?* - ed.]. He has since been monitoring the spot and pulls out any newcomers which emerge.

But, I wondered, is anybody actually tracking the spread of invasive plant species like Himalayan Balsam in Nova Scotia and doing something about the spread? Turns out that information and sporadic eradication attempts are scattered across various agencies. The Nova Scotia Department of Agriculture is responsible for 10 noxious weeds listed under the Province's Agricultural Weed Control Act (Himalayan Balsam isn't on it). But, the Department of Land and Forestry deals with invasives on provincial crown land, particularly those which pose a risk to human health, such as Giant Hogweed. HRM, in turn, is responsible for invasive plants such as Himalayan Balsam on municipal parks, trails, and playgrounds. And for help identifying and advice about managing invasive species on private land, they refer residents to the Nova Scotia Museum of Natural History, or the E.C. Smith Herbarium at Acadia.

Behind the scenes, there's an informal network of biologists, botanists, and conservationists in these government agencies, and also in Nova Scotian academic and non-profit organisations, who are first responders for provincial invasive species issues. They recently organised a volunteer brigade in Kentville to pull out Dog-strangling Vine, a type of climbing milkweed virtually unknown in Nova Scotia up to now which needs to be stopped before it becomes established. This informal network is currently setting up a Nova Scotia Invasive Species Council (NSISC). Claire Wilson, one of the coordinators of the new group, says NSISC's vision is to serve as a one-stop shop for people seeking information and advice regarding the identification and management of all invasives. Modelled on other provinces' invasive species councils, such as Alberta, it aims to coordinate information flows between government departments, and to promote coordinated management activities, including early detection, rapid response, distribution/mapping, control, and eradication. NSISC will also promote public education and undertake activities to raise awareness about invasive species. For more information or to submit an invasive species sighting, see NSISC's website.

As for me in Cow Bay, after clearing out all the Himalayan Balsam I could find, I now only have to patrol the pulled sites and the rest of the garden for stragglers – small plants I missed as they had not yet emerged from underneath the alders, spirea, wild roses, and winterberry that fill much of the area. These are easy to spot by their pink, helmet-shaped flowers poking through the brush. Those surrounded by wild roses or brambles are the worst, but if I don't get them, there will be a major outbreak of Himalayan balsam at that spot next year instead of the small patch I see now.



Sources:

David R. Clements, Kathleen R. Feenstra, Karen Jones, and Richard Staniforth, "The Biology of Invasive Alien Plants in Canada. 9. *Impatiens glandulifera* Royle", "Canadian Journal of Plant Sciences". 88, 2008, p. 403-417, <https://www.nrcresearchpress.com/doi/pdf/10.4141/CJPS06040>

Fred Pearce, "The New Wild: Why Invasive Species Will Be Nature's Salvation", Beacon Press, 2016.

Robert A. Tanner, "An Ecological Assessment of *Impatiens glandulifera* in its Introduced and Native Range and the Potential for its Classical Biological Control", PhD thesis, University of London, 2011, <https://core.ac.uk/download/pdf/78863851.pdf>.

To report an invasive plant sighting: Call Access Nova Scotia at 311 if it is on municipal property; call the Provincial Department of Natural Resources at 861-2560 if it is on a property that is not owned by the municipality; upload a picture of it onto iNaturalist; or submit a report to Nova Scotia's Invasive Species Council at <http://nsinvasives.ca>.

For help identifying and advice about managing invasive species on private land, call the Nova Scotia Museum, 424-3564 or the E.C. Smith Herbarium, Acadia University, 585-1335.



HFN TALKS

GLOBAL NATURE WATCH 7 JAN. – Stephanie Robertson and Janet Dalton

“FROM LOCAL TO GLOBAL AND BACK AGAIN – The Role of Local Observations in a Global Biodiversity Observation System”

Originally from the Yukon, Mike Gill grew up in Vancouver. Now living here in Canning, (he married a Maritimer), he has published 50 academic papers, is on the Board of Solar Energy NS, and has 25 years experience working on international ecological projects for different community organisations. He is also an Honorary Fellow of the UN Environment World Conservation Monitoring Centre and he gave us a jam-packed informative Zoom presentation.

In 1992, the following governmental target commitments were ratified – the International Platform on Biodiversity And Ecosystem Services; a UN List of Sustainable Development Goals; the Aichi (Japan) Biodiversity Targets; the Ramsar Convention on Wetlands (an inter-governmental treaty for the conservation and wise use of wetlands); and the UNCCD (a UN Convention to define goals to combat desertification). Canada signed on for all of these.

Then, the years 2011-2020 were declared the “UN Decade on Biodiversity”; but still, all countries have not signed on to the 2020 Paris Accord Commitment to stop global warming even though more species are already under extreme stress and earth's average temperature is still rising. Two sad slides, one of a dead elephant and one of a 12 ft mountain of elephant tusks, graphically illustrated a 2016 Biodiversity question “Has the earth's 6th mass extinction already arrived?” The 2020 well-meaning Global Environmental/Conservation targets have not been met, with one million species at risk of extinction. Forests have been reduced by two thirds; thirty percent of our oceans are no longer in their natural state; and there have been losses of six out of ten of all our fish, mammals, birds, and reptiles.

Only one out of 8.7 million of earth's species, we humans are using one half of the planet's biocapacity. Many drivers of biodiversity loss are global in scale, and these large losses, along with land clearing, have repercussions on human health and security, bringing humans in contact with wild animals and their diseases. In the ‘wet markets’ of China, where wild animals are caged alive in appalling conditions awaiting slaughter, it is thought that a coronavirus had jumped from wild Horseshoe Bats *Rhinolophus sinicus*, (the virus they carry has 96% similarity to COVID-19) to a

wild beast caught and destined for the table – a good example of the drastic repercussions of how we treat nature. At day's end these wild animals' faeces are washed into the streets causing even more contamination. These markets need to be strictly regulated, but not banned, as they will move to the Black Market where monitoring and regulation will be impossible.

The last 100 years of data show all major pandemics have occurred because of land use change. HIV is a classic; found in southeast Cameroon as a low-level disease in chimps, the reusing of needles for human immunisation spread it rapidly and it started to mutate. SARS, COVID, and their variants are still present in many Asian animals.

In order to truly work, any effective political commitment for biodiversity protection demands plenty of biodiversity data in order to not only determine whether countries are actually meeting their targets, but also to guide how they can best do so.

But globally, there is very limited quantity and quality of this data. The huge challenge is to remedy this lack and to create better, faster global biodiversity communications for all to easily use, so that coordinated political commitments can be effectively and quickly achieved.

Enter NatureServe in 1994, a North/South Americas' conglomerate of nonprofits – passionate biodiversity scientists aiming to make an easily accessible, accurate and fulsome biodiversity data system so that any legislative conservation actions will be truly effective. All of the above outlined organisations and activities recently led to a local and global ‘big push’ to greatly hasten effective conservation of our planet. In addition to Mike's introductory experience listed above, at the end of December 2020, he had just completed six years with NatureServe – as Co-Chair of its Earth Biodiversity Network Programme. Its concerted aims are:

- 1) To augment and species-broaden the present limited quality and quantity of biodiversity data.
- 2) To set up an effective and easily accessible global network of these increasing biodiversity observations.
- 3) To find, devise, and utilise the latest and best technologies to monitor biodiversity and the ‘pulse of our planet’.
- 4) To ‘stitch’ these all together to engender more timely and effective conservation action.



BIODIVERSITY OBSERVATION NETWORKS

Local Biodiversity Networks (BONs) work with different governments around the world to help them improve, simplify, and lessen the costs of their observation systems. For instance Mike himself is working presently with China, southeast Asia, different parts of Africa, the Arctic, and the Caribbean. BONs are formally connected to the larger Group on Earth Observations - Biodiversity Observation Network (GEO BON) whose mission is to improve globally the acquisition, coordination, and delivery of biodiversity observations and related services to users, including decision makers and the scientific community. There are also regional and national BONs; one is presently being set up for Canada.



BIODIVERSITY DATA

A 'Living Planet Index' map tracks about 16,000 vertebrate population trends around the planet. It shows all the places where data is observed, shared, and collected. The best data is in North America and Europe, where continuous surveys occur, such as breeding bird surveys and Christmas bird counts. However, there is a disconnect – the greatest numbers of species occur in areas we know the least about. Forty-three percent of known species data is found in only 2.4% of the earth's surface. This is where the importance of local/global spatial mapping comes in, and its range needs to be increased, as this mapping data will be key to conservation success. The Earth Biodiversity Network also aims to identify those biodiversity 'hotspots' which need immediate attention. With many, many biodiversity issues needing to be addressed, but not enough resources, prioritisation and triage will be necessary.

All around the world there is a surfeit of Natural History Museum collections. There is now a big global push underway to digitise and collate all that information – even from the 1880's – thereby facilitating fuller understanding of earth's biodiversity changes over time. Other deficiencies are taxonomic gaps. We tend to know a lot about vertebrates, especially birds, but not enough about others such as invertebrates, soil microbes, and fungi. The ecological services these supply are the essential underpinnings of all other species.

Observation methods have changed greatly from 1907 to the present. There is eBird, the 'Bison System', and then iNaturalist; this last application, presently the most used globally, can now itself recognise a species photo and tell you what it is.

Past and present ongoing bird observations are in a very large majority. But, there are many, many very important foundational life forms to count and record – such as prokaryotes (bacteria and archaea), and the less popular eukaryotes (fungi, invertebrates, and many plants) for which there is absolutely no data at all. A 'Red List' is now being developed which will monitor those less popular species of birds, fungi, and insects (*very little data here*), corals, plants, mammals, dragonflies, both bony and cartilaginous fish, reptiles, and amphibians.



NEW TECHNOLOGIES

New technologies are helping to address the above challenges and to better monitor the 'pulse of the planet'. To quantify global land cover, NASA has a constellation of earth observation satellites using **LandSat**, which monitors agriculture shortages, climate/weather changes, ecosystem disasters, and water temperature fluctuations. Ninety percent of monitoring is now collected this way. With agencies and partnerships sharing data it makes for a larger and more helpful global database. It is especially good for monitoring actual forest cover.

As an example of how much technology has improved, we were shown a very grainy 1972 NASA satellite image which was unrecognizable. Today, with the latest Landsat, one can see for instance if even just a few of trees have been knocked down, or reveal such things as illegal forest harvesting in South America, how many gorillas and elephants there are in an African forest, or how many penguins there are in the Antarctic. Also, using Artificial Intelligence (AI), the latest satellite computers can be trained to tell for instance the difference between a penguin and a rock. Mike showed us a slide illustrating disappearing forest cover changes between 2000 and 2013. Disgracefully, Canada is the worst country for forest degradation, mostly in western and central forests, and there are also large clearcuts for oil and gas development there. There are large losses in the Amazon, central Africa, and Russia as well.

Canada operates **RadarSat**, and Germany, other European countries, and Japan have their own satellite systems. All this makes for many multiples of earth 'passes' everyday, collecting terrabytes of crucial information and creating a firehose of data with not enough 'people-on-the-ground' for its evaluation.

Some countries don't have enough computing power, so it takes months and months for them to analyse any satellite data. Now there is **Cloud Computing**, another new monitoring strategy. It uses small bits of everyone's computer processing power/RAM when not being used by their owners, increasing the speed and capability to create a useful mosaic out of the data being collected. It only works because millions of computers are always turned-on and connected to the internet. In Indonesia, with its many days of cloud cover, composite images have to be made from cloud-free days' data.

Newer, lightweight **Geolocators** are now more accurate devices which are regularly and easily used for birds, butterflies, and even smaller insects. They transmit sunrise and sunset times and this pinpoints where animals are globally. For instance, with these devices it was discovered that the Arctic Tern travelled, nonstop, the same distance as that from earth to the moon and back three times – 1,153,200 kilometres!

I-CARUS is a recent space satellite antenna which picks up and 'tags' for instance locust/grasshopper and bird movements. It can even predict earthquakes, as animals react in a nervous way before they occur. This antenna not only measures the pressure and temperature of air, but also is able to pick up the temperature of such things as a cloud of locusts.

There are also modern **Camera Traps** which take pictures using infrared light. Thousands of these are used in China, where they discovered there were many more Snow Leopards than believed.

Inexpensive **Bio-Acoustic Sensors** are deployed to listen to sounds of nature, pooling species data from that. Much improved, these sensors are 'trained' to distinguish species-specific sounds from a cacaphony of calls; Mike played a Brazilian rainforest million-frog chorus; the sensor pinpointed one species (among others) out of the melee. This greatly reduces data analysis time, as experts don't have to be always consulted nor waited on for exact ID agreement and confirmation from others.



CITIZEN SCIENCE

eBird is a citizen science data system which has grown by leaps and bounds. Uploading your bird photo will ensure viewing by three experts; if all agree, it will be assigned 'research status' and added to the global database. Through eBird it was discovered that Barn Swallows fly from South to North America crowding along the eastern coastline, and that they need more preserve lands set aside for them to rest. Tried and true traditional methods are still used as well, such as mist nets for birds and bats, and GPS tagging.

iNaturalist works as does eBird. It's more valuable since it is used for all species – flora, fauna, insects, fungi, etc. Globally, over the past few years, it is being used more and more everyday by thousands and thousands of scientists globally, and – by local citizen scientists whose role is becoming more and more essential in augmenting global biodiversity observations and systems. All these iNaturalist submissions are stored in Copenhagen, Denmark, and once a week all those of research grade are uploaded to the Global Database (GD) system there. These observations have a very high value in global conservation efforts.



STITCHING IT ALL TOGETHER

Canada's Global Biodiversity Information Facility's (GBIF) **submitted data** is used for planning around conservation, food security, climate change (especially the effects of species' population changes in relation to global warming), and predictions of such human health risks as malaria-mosquitos and COVID. Mike is now working in SE Asia and the Arctic. In his own programme "Bridging the Gap Between Data and Decision" he and his team are building 'mapforms' to show governments places where endangered species are.

Questions followed Mike's information-packed presentation. Carol Morrison asked if permission is needed to use the public's RAM when 'Cloud Computing'; the answer was "No". Janet Dalton asked "How can we stop the spread of viruses?" The answer – "By better inspection and regulation of the Wet Markets." Ron Arseneault asked if all the separate data systems were joined together as yet. Mike did not know for sure but he felt this would soon be the case.

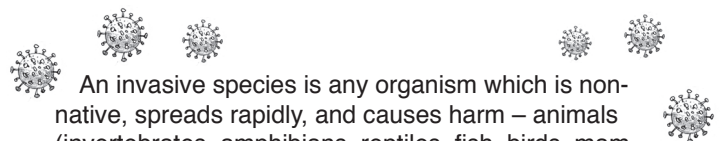
Peter Wells asked if the scientists who work on these data systems ever present briefs to politicians. Mike said that, usually, most scientists are not good communicators, but Google and MicroSoft and doing a good job!

INVASIVE NS SPECIES 4 FEB. – Jane Flemming

Nova Scotia Invasive Species Council's (NSISC) Project Coordinator Kristen Noel gave us a Zoom presentation about what the Council does; what invasive species are; and how they get here and how they spread, with some examples of invasive species and what we can do about them.

NSISC is a provincial chapter of the Canadian Council on Invasive Species. Formerly known as the Invasive Species Alliance of Nova Scotia, it operated out of Acadia University until 2012, when they revamped with a new name and a renewed mission – to raise awareness and promote a coordinated response to the threat of invasive species in Nova Scotia. They **support** a network of expertise, providing a forum for coordination of invasive species research and activities by connecting researchers, the public, and governments across geographic landscapes to improve collaborative abilities and predictive authority. They **facilitate** research projects which will further the understanding of best practices for invasive species management. They **collaborate** with government, NGOs, the public, and other stakeholders to provide up-to-date information about invasive species either in Nova Scotia already, or predicted to soon be present. They **provide** resources for the identification, mapping, and management of invasive species; promote public education; undertake activities to raise awareness, seek feedback and engage with individuals and groups about invasive species management. They **promote** coordinated management activities including early detection, rapid response, distribution/mapping, control, and eradication. NSISC's working groups use Outreach and Communication; Research; and Reporting and Mapping.

Outreach and Communication aims to raise public awareness about the invasive species' impact and to implement campaigns to prevent introduction and reduce spread. **Research** aims to identify invasive species knowledge gaps and to coordinate its proper management. **Reporting and Mapping** is currently developing a new citizen science tool but, in the interim, they are encouraging everyone to use iNaturalist. Their website has a 'button' for reporting invasive species, and all these are collected for further research and management.



An invasive species is any organism which is non-native, spreads rapidly, and causes harm – animals (invertebrates, amphibians, reptiles, fish, birds, mammals); pathogens (bacteria, fungi, nematodes); and plants (algae, ferns, mosses, gymnosperms, flowering plants). They are all unwittingly introduced by planting them in our gardens; introducing them to get rid of other invasives; releasing unwanted exotic pets; dumping aquarium plants; introducing new game species; and by importing commercial wood and shipping. Once here, invasives spread naturally (fish swimming, insects flying, plants going to seed or spreading underground). Seeds are dispersed by animals (bird droppings or on animal fur), by moving water, and by humans carrying them from place to place. They hitch rides on our boat trailers, in ballast tank water, on hiking boots, tire treads, your dog, transported fire-

wood, and/or uncleaned recreational equipment.

Globally, invasives' impacts are recognised as a huge threat to biodiversity; in Canada more than 20 percent of our species at risk are threatened to the point of extinction – by predation of our native species, taking their food and space, contributing to soil degradation and erosion, and degrading water quality and habitat. They can introduce new diseases, have adverse effects on human health, impact forestry/agriculture/fishing infrastructure and productivity, as well as reduce recreational opportunities.

There are many invasive species in Nova Scotia, so Kristin focussed on a representative sample of ten – Tunicates, Green Crabs, Small Mouth Bass, Chain Pickerel, Yellow Floating Heart, Hemlock Woolly Adelgid, Emerald Ash Borer, Dog Strangling Vine, Giant Hog Weed, White Nose Syndrome, and Glossy Buckthorn – representing various fresh water, marine, and terrestrial ecosystems.

Tunicates are marine, filter-feeding animals which attach to rocks, seaweeds, eelgrass, and other native species in low current areas, threatening local economies by disrupting food sources for commercial species, fouling aquaculture, fishing lines, and gear. **The Vase Tunicate** *Ciona intestinalis* is believed to have originated in Northern Europe. It's found along the south shore and its dispersion is likely due to their fouling of watercraft hulls. **The Golden Star Tunicate** *Botryllus schlosseri*, native to the Mediterranean Sea, is now found on all continents except Antarctica. It spreads during reproduction: fragments of a colony break off and bud elsewhere and eggs hatch into free-swimming larvae. Larvae travel short distances and settle within 24 – 48 hours; colony fragments can reproduce for up to 40 days and cover greater distances. Both fragments and larvae will settle and grow on a variety of artificial surfaces such as buoys, boat hulls, lines, wharf pilings, and floating docks as well as natural surfaces like rocks, mussels, and kelp. **The Violet Tunicate** *Botrylloides violaceus* is native to Asia and was first observed on our coasts in the 1990's; its life cycle is not fully understood, but it spreads similarly to the Golden Star Tunicate.

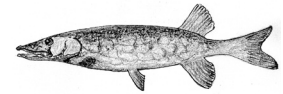


The **Green Crab** *Carcinus maenas* is a small shore crab capable of tolerating a wide range of salinities in shallow protected areas on sandy beaches, salt marshes, and rocky coasts. Adults reach up to 10 cm with serrated shells and spines – three between the eyes and five on each side; the tips of their back legs are pointed, flat, and hairy. They pose a serious threat to estuarine and marine ecosystems, aggressively preying on oysters, mussels, clams, and native juvenile crabs. They out-compete our crabs for food, disrupt eel grass beds, and destroy bivalve shellfish beds. They are harmful to fishing and aquaculture industries, competing with native crabs and lobsters for resources and damaging eels when they enter their traps. Native to Europe and North Africa, they arrived around 1817 in the holds of wooden ships. They spread mostly during their larval stage (which can last for 90 days) through ballast water transfers and ocean currents, also by fishing gear movement and through the discharge of bi-catch. The larval stage can last up to 90 days, and

they survive in ballast water tanks for a long time. They are found coastally from Cape Breton to the south shore.



Smallmouth Bass *Micropterus dolomieu* is a freshwater fish with a brown to green body with blotchy, vertical bars, white belly, and spiny back fin. Normally 10-15 inches long, its habitat is rocky-bottom lakes and streams with plenty of shade. It efficiently preys on smaller fish, mammals, and amphibians, also consuming their food. It was spread by intentional introduction for sport, and the first authorised release took place in 1942 in Bunkers Lake, Yarmouth County. The last authorised introduction occurred in 1984. Its spread threatens native fish communities in more than half of Nova Scotia's watersheds.



Chain Pickerel *Esox niger* is a torpedo-shaped freshwater fish with an average length of 15 to 20 inches, and a green body with a darker back and a white belly. Adults have a chain link pattern along their sides, thus their name. It inhabits shallow, vegetated ponds, lakes, and streams, and voraciously go after anything which is smaller than themselves. Altering and harming native ecosystems and biodiversity, they negatively impact traditional fishing. It was also an introduction, being planted in three lakes in 1945, then subsequently spreading to 95 known locations.

Yellow Floating Heart *Nymphoides peltata* is a bottom-rooted, floating-leaved aquatic plant with bright yellow flowers and 3 -15 cm wavy-edged leaves; it blooms from June to August. Growing from the water's edge to depths of 4 metres, and forming dense mats of floating vegetation, it crowds out native species, creating stagnant areas which negatively affect freshwater habitats and hinder recreations such as swimming and canoeing. Native to Europe and Asia, in 1991 it was marketed as an ornamental in the United States and spread as a horticultural species. In 2006, it was introduced here and escaped from a water garden at Little Albro Lake, Halifax County.



The **Hemlock Woolly Adelgid** *Adelges tsugae* is an infamous aphid-like invasive infesting Hemlocks. Its presence is revealed by white woolly egg sacs at the bases of hemlock needles. It feeds on nutrient and water storage cells there, causing premature budding, needle loss, and twig and branch dieback, which can kill hemlocks in four to twenty years. Their crowns will turn a grey-yellow dull green and foliage will be discoloured. Hemlocks play an important environmental role; losing them could have a devastating effect on associated birds, mammals, and aquatic organisms, and a deleterious economic effect as they are used for construction and pulp. Native to Asia, it was first detected in Nova Scotia 2017, likely introduced to the US via infested Japanese nursery stock. It appeared first in Virginia in 1951, and is now found from Georgia to

Maine and into Nova Scotia. It threatens all Hemlocks, and there is particular concern for old-growth Kejimikujik Hemlocks. Scientists are researching multiple options to save them – with chemical treatments like insecticides; silviculture (selectively cutting some to allow more sunlight to reach them); biological control (introducing natural predators); and genetic control (breeding resistant hemlocks). They are not currently listed as endangered, but it's important to be proactive before it's too late.



The **Emerald Ash Borer** *Agrilus planipennis* is a metallic green beetle about half an inch long; its white flat larvae grow up to double adult size. Adults chew themselves out through the bark, creating an identifying D-shaped hole; another sign of their presence is an increased number of woodpeckers which come to feed on the larvae. Once infested the tree will die after two to three years; the mortality rate is 100 percent. Ash losses are devastating to forest habitats, affecting tree species composition, native biodiversity, forest succession, nutrient cycling, and important resources for a number of other species. Canopy gaps caused by dying Ash can cause the establishment and spread of invasive plants. Ash plays a vital role in our economy as it is used in furniture, building supplies, and recreational products; it also has important Mi'kmaq cultural significance – it is the material used in their famous baskets. This invasive was first detected in North America in 2002, and since then it's been estimated to have killed millions of trees and could ultimately kill or damage billions. Native to East Asia, it likely arrived in North America on wood packaging materials in the early 1990's. It was found in Bedford in 2018 and has been recently reported in Dartmouth. Commonly spreading through movement of infested firewood, logs, and branches, it's poised to spread further into the province and could have catastrophic impacts on the Black Ash *Fraxinus nigra* which is currently designated as threatened here. This is an ash species native to much of eastern Canada and the northeastern United States. Formerly abundant, as of 2014 it is threatened with near total extirpation.

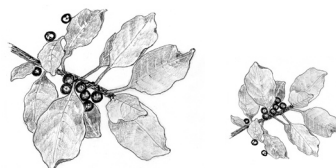


Dog Strangling Vine *Cynanchum rossicum* (in spite of its name it will not strangle your pets) refers to two invasive milkweed family plants native to Europe and Asia – Black Swallowwort and Pale Swallowwort. Introduced to the northeastern United States in the mid-1800s as garden plants, they've since spread to Nova Scotia. Currently found in Wolfville, North Kentville, and Dartmouth, it prefers open sunny areas, and also light shade, growing aggressively up to 2 metres by wrapping around trees and plants or trailing along the ground. Dense patches can 'strangle' whatever it chooses. Seeds are easily wind-spread, and new plants grow from root fragments which makes it very difficult to destroy. Just

like Japanese Knotweed; unless you get every little bit, it will regrow. It has invaded ravines, hillsides, fence lines, stream banks, roadsides, and utility corridors, creating dense stands which overwhelm native plants and young trees, preventing forest regeneration. Its colonies form interwoven mats difficult to walk through, and interfere with forest management and recreational activities.

Giant Hogweed *Heracleum mantegazzianum* is a member of the parsley or carrot family – the Umbellifers. Native to Europe and Asia, it was first introduced as a garden ornamental. With bold, tropical looking leaves and white, umbrella-shaped clustered flowers, it can grow up to 5 metres when in bloom. It has escaped garden settings and is highly invasive, posing significant risk to human health and ecosystems. Its sap contains toxins which cause severe dermatitis; skin will blister similar to a third degree burn and can scar for up to six years. In the eyes it can cause permanent blindness. If you come in contact with it, a hospital trip is strongly recommended. Infestations can cause erosion of stream banks, particularly when winter dieback exposes soils to rain. Its large size and rapid growth quickly dominates invaded ravines and stream banks, which significantly reduces any habitat available for native plants and wildlife. Giant Hogweed produces 50,000-100,000 winged seeds which can remain viable in soil for up to 15 years! To prevent its spread remember to clean off your gear to ensure you are not unintentionally spreading its seeds. In the 1980's this plant was present in the garden of the Alexander Graham Bell Museum in Baddeck, NS; there are now several more locations, including Jollimore, Purcell's Cove, Halifax, Dartmouth, Wolfville, Grand Pré, Sydney, Kentville, Sheffield Mills, and Truro.

White Nose Syndrome, *Pseudogymnoascus destructans* (Pd) is an invasive fungus which infects hibernating bats. Its spores are introduced to uninfected hibernacula (bat hibernating sites), causing a white, fungal fuzz on bats' bare facial skin. This causes them to be more active when they are supposed to be hibernating; they then lose their body fat which they need to survive the winter. Pd has caused the most staggering North American wildlife decline in recorded history. In Canada the total *Myotis* spp. bats recorded in NS, NB, ON, and QC hibernacula declined by 94% between 2010 and 2012. Thought to have been introduced from an infected cave in Europe to a tourist cave in Albany, NY, it is transmitted through individual bat contacts, spreading rapidly. Autumn bat-swarming behaviour transmits Pd between bat populations, and as some species hibernate away from swarming sites, it also facilitates its spread elsewhere. Pd can also be spread by humans visiting contaminated sites who then travel to non-contaminated sites; it is presumed to be everywhere in Nova Scotia where bats are found.



Glossy Buckthorn *Frangula alnus* is a threat to several native flora species. It displaces native plants through

the shading, competition, and alteration of ecosystem function. Glossy Buckthorn causes erosion, particularly in riparian habitats (along the banks of rivers and streams) and may also cause habitat loss for our native turtles.

Species at Risk Threatened by Invasives Examples of those classified as 'Endangered' were the Atlantic Whitefish, and the Blanding's and Wood Turtles, especially their hatchlings. Classified as 'Vulnerable' is the Snapping Turtle and its hatchlings. All are threatened by Small Mouth Bass and Chain Pickerel. The 'Threatened' Brook Floater is imperiled by both the invasive Zebra and Quagga Mussels. Various Coastal Plain Flora are classified as 'Threatened' by the Glossy Buckthorn.

The Atlantic Whitefish is a species unique to Canada. They have been reported only in the Tusket and Petite Rivière watersheds. The Tusket River population no longer exists; the Petite Rivière population is the last remaining population in the world.

The **Brook Floater**, a native North American freshwater mussel, is at risk from the non-native invasives Zebra Mussels and Quagga mussels. They have not been introduced here as yet, but they have made their way into New Brunswick. Given that the Brook Floater is only found in a handful of Nova Scotian rivers, the introduction of invasive mussels could be devastating.

How we can get rid of invasive species? The 'invasion curve', a type of graph we've all grown familiar with during the COVID-19 pandemic, is an immediate and sobering demonstration of the difficulty of dealing with invasives and the importance of early detection and prevention. Once having taken hold, eradication attempts are expensive, time-consuming, and resource-draining; the invasion curve shows eradication to be really only feasible in its early stages. By the time the public has become aware of invasive species, eradication is unfeasible because it would require such an intense and costly effort; it is imperative that it be detected early, and acted upon immediately, or it will quickly get out of control. If there is one big message I took away from Kristen's talk it is that the most effective way forward is to prevent introduction, and to reduce their spread. NSISC has a number of programmes aimed at informing people about invasive species and how to prevent their spread.

'Clean Drain Dry' is aimed at boaters, anglers, hunters, and divers who might unintentionally spread invasive species from one body of water to another. It encourages boaters to always inspect their hulls, ballast, and bilge tanks when they pull their vessels onto shore to ensure they are not carrying any debris, including plants and animals.

'Don't Let it Loose' aims to inform the public about the danger of releasing plants and animals which are not native to Canada. You can prevent the introduction of aquatic and terrestrial invasive species by never releasing aquarium pets, water-garden plants, live food, or live bait into rivers, streams, lakes, ponds, or storm sewers. Sport fish should only be released back into the waters from which they were caught (catch and release) – never move a sport fish from one body of water to another. Released exotic pets are unlikely to survive and may suffer before dying; if they do survive, they may become an invasive against which native wildlife may not have necessary defenses.

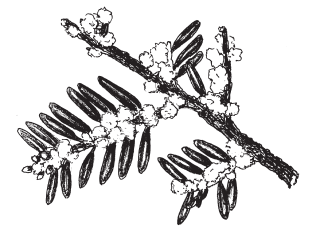
'Play Clean Go' means before or after you enter or leave a natural site, clean off your gear as you never know what might be hitching a ride. Seeds, spores, and insects are all candidates for hitchhiking – they may attach themselves to the treads or laces of your hiking boots, to your pets, or to your clothing.

'Buy Local Burn Local' encourages people to purchase firewood near to where they will use it, and to leave any unused wood on site. Moving firewood along with any hidden pests from one location to another can threaten native woodland and urban trees. These pests may move only short distances on their own but they will travel long distances on moving firewood. This programme stops the spread of forest pests such as the Emerald Ash Borer, Hemlock Woolly Adelgid, Asian Longhorned Beetle *Anoplophora glabripennis*, and invasive seeds and spores.

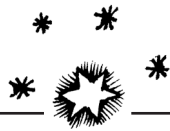
'Be Plant Wise' seeks to educate gardeners, garden retailers, nurseries, growers, and the landscape industry to understand what invasive plants are, why they are a problem, and what they can do to prevent their spread; to stop buying and selling invasive plants; to promote the sale and purchase of non-invasive alternative plants; to control or replace invasive plant species; and to dispose of unwanted plants/plant material properly. 'Be Plant Wise' also suggests non-invasive substitutes for invasive plants. For example Yellow Floating Heart can be replaced with Fragrant Water Lily, Yellow Pond Lily, and/or Floating Heart, which are all attractive native plants. Giant Hogweed can be replaced by Cow Parsnip, Queen Anne's Lace, Elderberry, Angelica, or Wild Parsnip.

The key ideas that Kristen hoped to convey in her talk were: Invasives can be devastating to biodiversity, harmful to people, expensive to control, and extremely difficult to remove once established. Prevention/reduction of spread is the best management option. Humans play an important role in the spread of invasives – therefore we must play an important role in stopping them! Some upcoming projects of NSISC include installing signs (such as 'Clean Drain Dry' signs at popular boat launches); producing resources; collecting pledges; and encouraging people to record their observations on iNaturalist.

NSISC membership is free. Contact Kristen if you are interested in becoming a member or joining any of their working groups. Sign up for their newsletter by visiting www.nsinvasives.ca, (where there are some great resources and links), or by contacting Kristen at kristen-noel@nsinvasives.ca. There is a twitter account @**invasives1**, and a Facebook page. The Nova Scotia Department of Lands and Forests also has some very useful and interesting resources concerning the Biodiversity Act and the Biodiversity Council (mentioned during the question and answer period) at <https://novascotia.ca/natr/biodiversity/>. (to be continued in the next issue - Ed.)



ALMANAC



This almanac is for the dates of events which are not found in our HFN programme: for field trips or lectures which members might like to attend, or natural happenings to watch for, such as eclipses, comets, average migration dates, expected blooming seasons, etc. Please suggest other suitable items.

“The snow, the way it is here in March:
exhaust-scorched, coarse with road salt.
The rust and the sleet, endless cloy of lines.”

– *David Huebert, opening lines of “Season’s End” published in Humanimus (2020)*

NATURAL EVENTS

- 14 Mar.** Daylight Saving Time starts on Sunday, March 14th at 02:00 a.m.
- 20 Mar.** Vernal Equinox at 06:37 ADT
- 28 Mar.** Full Moon. Moonrise at 19:35 ADT
- 27 Apr.** Full Moon. Moonrise at 21:09 ADT
- 26 May** Full Moon. Moonrise at 21:23 ADT
- 28 May** Last spring frost in Halifax; Env. Canada says there is only a 1:10 chance that a spring frost will occur after this date; look forward to 155 frost-free days.
- 28 May** Venus and Mercury appear close together in the evening sky.
- 8 Jun.** World Oceans Day.
- 10 Jun.** Partial Solar Eclipse beginning just before sunrise; maximum eclipse an hour later.
- 10 Jun. -20 Jun.** The earliest mornings of the year: sun rises at 5:28 ADT
- 20 Jun. -30 Jun.** The latest evenings of the year: sun sets at 21:03 ADT
- 21 Jun.** Summer Solstice at 00:32 ADT. Summer begins in the Northern hemisphere. The longest day of the year, with 15 hours and 34 minutes of daylight at Halifax.
- 24 Jun.** Full Moon. Moonrise at 21:26 ADT.

– *Sources: Atmospheric Environment Service, Climate Normals 1951-80 Halifax (Shearwater A) N.S.; Blomidon Naturalists Society 2021 Calendar; <https://www.timeanddate.com/>*

SUNRISE AND SUNSET ON SPRING AND EARLY SUMMER SATURDAYS FOR HALIFAX: 44 39 N, 063 36 W



| | | | | | |
|----------------|--------------|--------------|----------------|-------|-------|
| 6 Mar. | 06:42 | 18:09 | 4 Apr. | 06:49 | 19:45 |
| 13 Mar. | 06:29 | 18:18 | 11 Apr. | 06:36 | 19:54 |
| 20 Mar. | 07:17 | 19:27 | 18 Apr. | 06:24 | 20:03 |
| 27 Mar. | 07:04 | 19:35 | 25 Apr. | 06:13 | 20:12 |
| 2 May | 06:02 | 20:20 | 6 Jun. | 05:29 | 20:56 |
| 9 May | 05:53 | 20:29 | 13 Jun. | 05:28 | 21:00 |
| 16 May | 05:45 | 20:37 | 20 Jun. | 05:28 | 21:03 |
| 23 May | 05:38 | 20:44 | 27 Jun. | 05:31 | 21:03 |
| 30 May | 05:33 | 20:51 | | | |

ORGANISATIONAL EVENTS

Blomidon Naturalists Society: Meetings at present take place via Zoom on the 3rd Monday of the month at 7:30 p.m. For more information go to <http://www.blomidonnaturalists.ca>.

- 27 Mar.** “Hemlock Woolly Adelgid Surveying” a field trip with Soren Bondrup-Nielsen.
- 19 Apr.** “Wildlife, Disease and Climate Change” with researchers at the Canadian Wildlife Health Cooperative.
- 8 May** “Beginning Birding Workshop”
- 17 May** “Sustainable Forest Management”
- 5 Jun.** “Forest Ecology Workshop”
- 26 Jun.** “Wildflower Workshop”

Nova Scotia Museum of Natural History: For more information 424-6099, 424-7353, <http://naturalhistory.novascotia.ca>.

- 13 Mar. -6 Sept.** “Something wonderful this way comes”. Drawn from the Museum’s collections, this fun and whimsical exhibit will feature rarely seen and never before seen items and specimens.

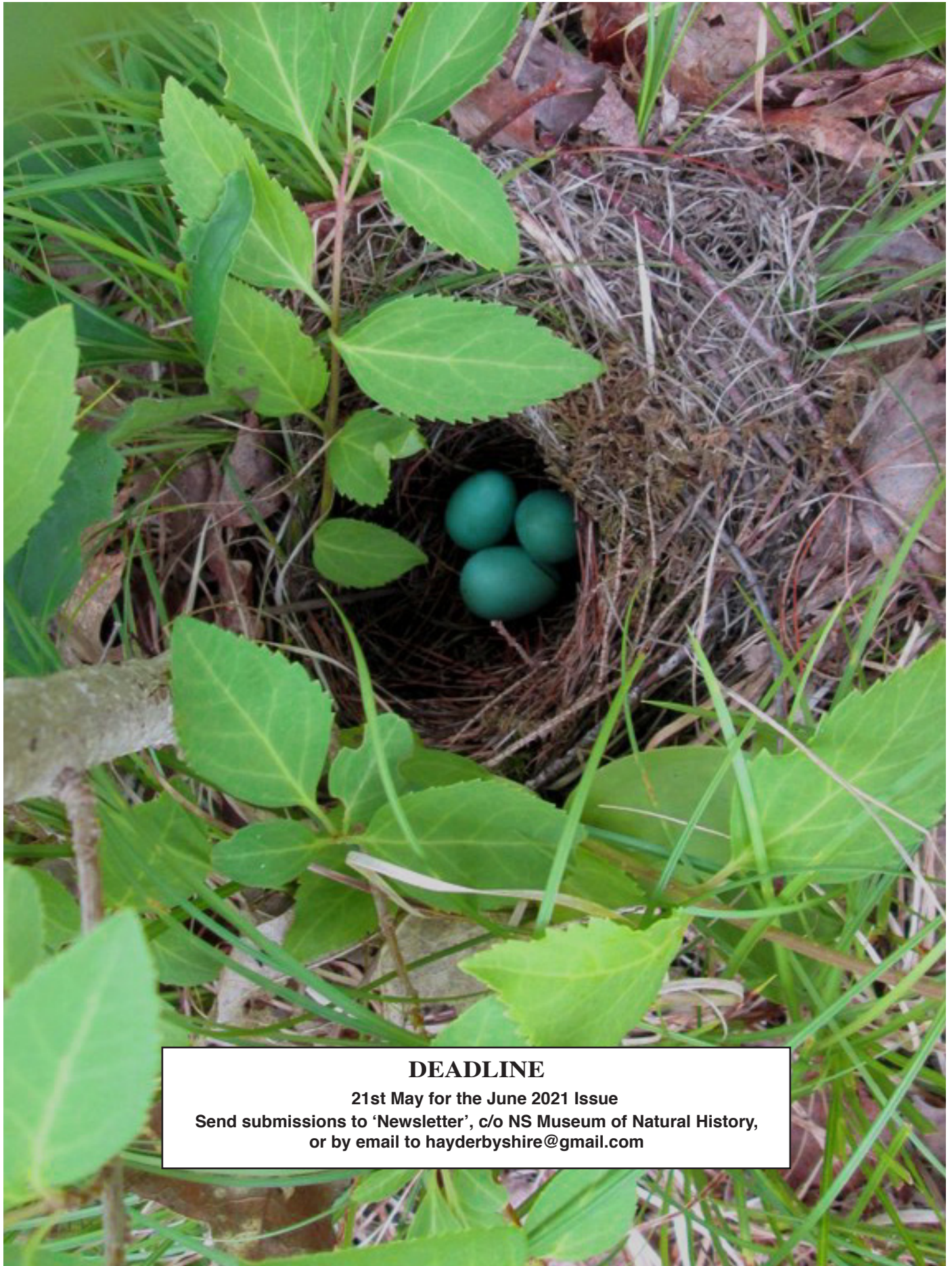
Nova Scotia Wild Flora Society: Meetings at present take place via Zoom on the fourth Monday of the month. For more information, nswildflora@yahoo.ca, or <http://www.nswildflora.ca>.

- 22 Mar.** “Old Growth Identification and Protection on Crown Lands”, with speakers Peter Bush and Brad Butt, NS Dept. of Lands and Forestry.

Nova Scotian Institute of Science: Meetings at present take place via Zoom on the first Monday of the month, September to April, at 7:30 p.m. For more information <http://nsis.chebucto.org>.

- 12 Apr.** “Wayfinding Under the Waves” with speaker Dr. Russell Wyeth, St.F.X.

– *compiled by Patricia L. Chalmers*



DEADLINE

21st May for the June 2021 Issue

**Send submissions to 'Newsletter', c/o NS Museum of Natural History,
or by email to hayderbyshire@gmail.com**